

This Page Is Inserted by IFW Operations
and is not a part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

**As rescanning documents *will not* correct images,
please do not report the images to the
Image Problem Mailbox.**

(19) World Intellectual Property Organization
International Bureau(43) International Publication Date
5 June 2003 (05.06.2003)(10) International Publication Number
WO 03/045476 A1

(51) International Patent Classification⁷: A61M 5/178 (74) Agent: PARK, Byung, Chang; #301 Woojin Bldg., 1445-2 Seocho-dong, Seocho-gu, Seoul 137-070 (KR).

(21) International Application Number: PCT/KR01/02064 (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(22) International Filing Date: 29 November 2001 (29.11.2001) (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

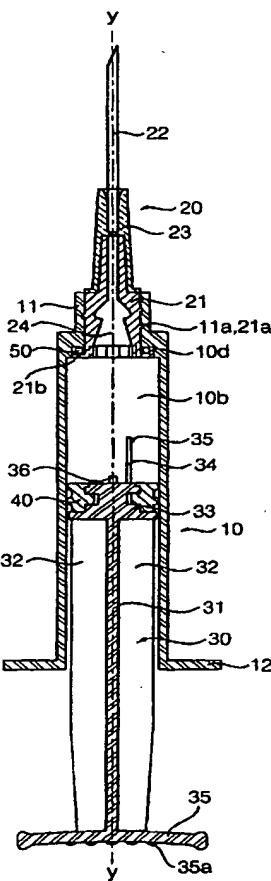
(25) Filing Language: Korean (26) Publication Language: English

(30) Priority Data: 2001/74271 27 November 2001 (27.11.2001) KR (71) Applicant and (72) Inventor: POK, GEO SEONG [KR/KR]; 224-104 Family Apt. 150, Munjung-dong, Songpa-ku, 138-200 Seoul-si (KR).

[Continued on next page]

(54) Title: SAFETY SYRINGE

(57) Abstract: Disclosed is to a safety syringe. An adapter having a needle is threaded into a neck part of a cylinder, preventing fluctuation of the needle, so the needle can be precisely pricked. Grooves are defined in the adapter, and projections are formed on the plunger so that the projections can be smoothly engaged into the grooves. If the plunger is rotated, as the adapter is integrally rotated, the adapter is unthreaded from the cylinder. A rod having a hook is eccentrically formed on the plunger, and the adapter is formed with a hollow part and a hook engaging portion. Therefore, the rod can be inserted into the hollow part while being bent inward, and the hook can be engaged with the hook engaging portion. In this state, as the plunger is pulled backward, the needle is withdrawn into the cylinder, and subsequently collapsed by pushing the plunger.



WO 03/045476 A1



Published:

— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

SAFETY SYRINGE

Technical Field

The present invention relates to a syringe, and more particularly, the present invention relates to a safety syringe which is constructed in such a way as to allow an injection needle to be withdrawn into a cylinder and then collapsed after injection of liquid medicine, thereby preventing reuse of the syringe, protecting medical personnel and others from being stuck by the injection needle after completion of injection, and avoiding a safety-related accident.

Background Art

There is known in the art a safety syringe which allows an injection needle to be withdrawn into a cylinder and then collapsed, after injection of liquid medicine, that is, injection liquid.

A conventional safety syringe includes an elongate cylinder, an adapter, an injection needle and a plunger. The cylinder defines a space in which injection liquid is accommodated and has a neck part which is projectedly formed on an upper end of the cylinder. The adapter is vertically fitted into the neck part of the cylinder, with a sealing ring interposed between the

adapter and the neck part. The injection needle is fitted through an upper end of the adapter. The plunger is inserted into the cylinder so that it can be moved upward and downward. The plunger functions to suck injection liquid into the cylinder and discharge 5 injection liquid accommodated in the cylinder to the outside. A projection is formed on an upper end surface of the plunger to extend upward while having a central axis which corresponds to that of the cylinder. The projection is formed, at an upper end thereof, with an arrow-shaped head portion. The adapter is formed 10 with a socket part which is eccentrically positioned from the central axis of the cylinder and into which the arrow-shaped head portion of the projection is fitted. If the plunger is fully pushed into the cylinder, as injection of liquid medicine is completed, the arrow-shaped head portion of the projection, which 15 is formed on the upper end surface of the plunger, is fitted into and thereby coupled to the socket part of the adapter. In this state, by pulling the plunger out of the cylinder, the adapter and the injection needle affixed to the adapter are moved to be withdrawn into the cylinder. If the injection needle is 20 completely withdrawn into the cylinder, due to the presence of the socket part eccentrically positioned with respect to the cylinder, the injection needle is inclined sideways inside the cylinder. Then, by pushing again the plunger into the cylinder, the

injection needle is bent and collapsed inside the cylinder, whereby reuse of the syringe is prevented.

However, the conventional safety syringe constructed as mentioned above suffers from defects in that, since the injection 5 needle is fitted through the upper end of the neck part of the cylinder in such a way as to be moved upward and downward along a straight path, if force of no less than a predetermined magnitude is applied to the injection needle, the injection needle is fluctuated, whereby it is difficult to prick the injection needle 10 at a precise position into the human body. Also, because the arrow-shaped head portion of the projection formed on the upper end surface of the plunger has a complicated configuration and the adapter should be formed with the socket part into which the arrow-shaped head portion of the projection is fitted, a 15 manufacturing cost of the safety syringe is increased. Further, in the case that the adapter is coupled to the neck part of the cylinder with excessively large force, when the plunger is pulled out of the cylinder, the arrow-shaped head portion of the projection is disengaged from the socket part of the adapter, 20 whereby the adapter and the injection needle cannot be withdrawn into the cylinder.

Moreover, at the time when injection of liquid medicine is completed, as the arrow-shaped head portion of the projection is

forcibly inserted into the socket part of the adapter, shock is generated and transferred to the human body through the injection needle.

Disclosure of the Invention

5 Accordingly, the present invention has been made in an effort to solve the problems occurring in the related art, and an object of the present invention is to provide a safety syringe in which an injection needle is rigidly coupled to a cylinder, whereby the injection needle is prevented from being fluctuated 10 during injection of liquid medicine and is allowed to be withdrawn into the cylinder through simple manipulation and then collapsed, after completion of injection.

Another object of the present invention is to provide a safety syringe which does not apply any shock to the human body at 15 the time when injection of liquid medicine is completed, as in the conventional syringe.

Still another object of the present invention is to provide a safety syringe which allows an injection needle to be inclined sideways by force of a substantial magnitude when the injection 20 needle is withdrawn into the cylinder, thereby reliably preventing the injection needle from being extended again out of the cylinder.

Yet still another object of the present invention is to provide a safety syringe which simplifies means for withdrawing an injection needle into a cylinder, thereby decreasing a manufacturing cost.

5 In order to achieve the above object, according to one aspect of the present invention, there is provided a safety syringe comprising: a cylinder defining a space for accommodating injection liquid and having a neck part projectedly formed on a center portion of an upper end thereof; an adapter coupled to the
10 neck part of the cylinder; an injection needle connected to an upper end of the adapter; and a plunger inserted into the cylinder so that it can be moved upward and downward, for discharging the injection liquid accommodated in the cylinder, through the adapter and the injection needle to the outside; wherein a rod vertically
15 projects from an upper end surface of the plunger in such a way as to be eccentrically positioned from a central axis of the cylinder, and an upper end of the rod is formed with a hook part; and wherein the adapter is defined with a cavity into which the rod can be inserted, an inner surface of the adapter which defines
20 the cavity is formed as an inclined surface so that the upper end of the rod can be brought into contact with the inner surface of the adapter and thereby bent inward toward a central axis of the adapter when the plunger is pushed into the cylinder, a hook

engaging portion is formed on the inner surface of the adapter so that the hook part of the rod can be engaged into the hook engaging portion, the adapter is threadedly coupled to the neck part of the cylinder, and coupling means is arranged to the 5 adapter and the plunger in a manner such that the adapter can be integrally rotated when the plunger is rotated.

According to another aspect of the present invention, the coupling means comprises grooves which are vertically defined adjacent to a lower end of the adapter, and projections which are 10 vertically formed on the upper end surface of the plunger to be inserted into the grooves of the adapter.

In the safety syringe according to the present invention, constructed as mentioned above, when the plunger is pressed to be fully pushed into the cylinder, the projections formed on the 15 upper end surface of the plunger are engaged into the grooves defined in the adapter, and the upper end of the rod is inserted into the cavity of the adapter while being brought into contact with the inner surface of the adapter and thereby bent inward toward the central axis of the adapter. The hook part formed on 20 the upper end of the rod is positioned above the hook engaging portion formed at a location corresponding to the middle of the cavity. In this state, if the plunger is rotated, since the projections of the plunger are engaged into the grooves of the

adapter, the adapter and the plunger are integrally rotated with each other. According to this, as the adapter is unthreaded from the neck part of the cylinder, the adapter is retracted into the cylinder. Then, by pulling the plunger out of the cylinder, as 5 the hook part of the rod formed on the plunger is engaged with the hook engaging portion of the adapter, the adapter and the injection needle are withdrawn into the cylinder. At this time, as the rod, which is bent inward toward the central axis of the adapter, is unbent to extend in a vertical direction, the rod 10 biases the adapter, whereby the adapter and the injection needle are inclined sideways in the cylinder. In this state, by pushing again the plunger into the cylinder, the injection needle is collapsed against an inner surface of the cylinder.

Brief Description of the Drawings

15 The above objects, and other features and advantages of the present invention will become more apparent after a reading of the following detailed description when taken in conjunction with the drawings, in which:

FIG. 1 is a cross-sectional view illustrating a safety 20 syringe in accordance with an embodiment of the present invention;

FIG. 2 is an exploded perspective view of the safety syringe shown in FIG. 1;

FIG. 3 is an enlarged cross-sectional view illustrating an adapter and an upper end of a plunger which constitute the safety syringe shown in FIG. 1;

FIG. 4 is a cross-sectional view taken along the line B-B 5 of FIG. 3;

FIG. 5 is a cross-sectional view taken along the line C-C of FIG. 3;

FIG. 6 is a perspective view illustrating the adapter shown in FIG. 1;

10 FIG. 7 is a cross-sectional view illustrating the safety syringe according to the present invention, when injection of liquid medicine is completed;

15 FIG. 8 is an enlarged cross-sectional view illustrating a state wherein the adapter and the upper end of the plunger shown in FIG. 7 are coupled with each other;

FIG. 9 is a cross-sectional view of the safety syringe according to the present invention, illustrating a state wherein an injection needle assembly is withdrawn into a cylinder; and

20 FIG. 10 is a cross-sectional view of the safety syringe according to the present invention, illustrating a state wherein an injection needle withdrawn into the cylinder is collapsed.

Best Mode for Carrying Out the Invention

Reference will now be made in greater detail to a preferred embodiment of the invention, an example of which is illustrated in the accompanying drawings. Wherever possible, the same reference numerals will be used throughout the drawings and the description 5 to refer to the same or like parts.

FIG. 1 is a cross-sectional view illustrating a safety syringe in accordance with an embodiment of the present invention; FIG. 2 is an exploded perspective view of the safety syringe shown in FIG. 1; and FIG. 3 is an enlarged cross-sectional view 10 illustrating an adapter and an upper end of a plunger which constitute the safety syringe shown in FIG. 1.

As shown in FIGs. 1 through 3, a safety syringe in accordance with an embodiment of the present invention includes an elongate cylinder 10, an injection needle assembly 20, and a 15 plunger 30. The cylinder 10 defines a space 10b for accommodating injection liquid. The injection needle assembly 20 is connected to an upper end of the cylinder 10. The plunger 30 is inserted into the cylinder 10 so that it can be moved upward and downward. The plunger 30 functions to suck injection liquid into the 20 cylinder 10 and discharge injection liquid accommodated in the cylinder 10 to the outside.

A cylindrical neck part 11 having a diameter smaller than that of the cylinder 10 is projectedly formed on the upper end of

the cylinder 10. A central axis of the neck part 11 corresponds to a central axis y-y of the cylinder 10. An internal thread 11a is formed on a circumferential inner surface of the neck part 11, and a knob part 12 is formed on a lower end of the cylinder 10.

5 The injection needle assembly 20 is composed of an adapter 21 coupled to the neck part 11, a hub 23 press-fitted around an upper end of the adapter 21, and an injection needle 22 fixedly fitted through an upper end of the hub 23.

10 The adapter 21 has a lower half which is formed to have a cylindrical contour and an upper half which is formed to have a truncated cone-shaped contour. An external thread 21a is formed on a circumferential outer surface of the adapter 21 so that it can be threadedly coupled with the internal thread 11a of the neck part 11. An outward flange 21b is formed around a lower end of 15 the adapter 21.

The external thread 21a and the internal thread 11a are formed as four to eight start helical threads. The helical threads are formed to have a slope θ' of $25\text{--}50^\circ$ when measured from a horizontal plane of the outward flange 21b.

20 It is preferred that the threads are formed as four start threads, and the slope θ' is 30° .

On the other hand, adjacent to the upper end of the cylinder 10, an annular seat portion 10d is formed on a lower

surface of the neck part 11 of the cylinder 10. When the adapter 21 is threadedly coupled to the neck part 11, the outward flange 21b of the adapter 21 is fittedly seated on the annular seat portion 10d. At this time, an O-ring 50 is intervened between the 5 annular seat portion 10d and the outward flange 21b. In this way, the adapter 21 is airtightly and firmly coupled to the upper end of the cylinder 10.

In the meanwhile, the plunger 30 has a rod part 31 which has a central axis corresponding to the central axis y-y of the 10 cylinder 10, and several ribs 32 which radially project from the rod part 31. A head part 33 is formed on an upper end of the rod part 31, and a polygonal knob portion 35 is formed on a lower end of the rod part 31.

In order to ensure that the polygonal knob portion 35 is 15 easily rotated using the fingers, it is preferred that the polygonal knob portion 35 has a contour of a quadrangle with each side curved inward. A plurality of fine protrusions 35a are formed on a lower surface of the polygonal knob portion 35 so as to prevent slippage of the fingers.

20 As can be readily seen from FIGs. 3 and 5, a rod 34 is formed on an upper end surface of the head part 33 of the plunger 30 in a manner such that it projects upward in a vertical direction and is eccentrically positioned from the central axis y-

y of the cylinder 10 by a distance l_1 . The rod 34 has a quadrangular bar-shaped contour, and a hook part 35 is formed on an upper end of the rod 34 to extend in a horizontal direction.

Further, as shown in FIGs. 3, 4 and 6, a pair of 5 projections 36 are formed on the upper end surface of and adjacent to an edge of the head part 33 of the plunger 30 in a manner such that they extend in the vertical direction and are oppositely positioned to each other. The projections 36 are formed to have a length which is far shorter than that of the rod 34.

10 The adapter 21 is defined with a cavity 24 which extends from a lower end toward an upper end of the adapter 21. A central axis of the adapter 21 corresponds to the central axis y-y of the cylinder 10. The cavity 24 is divided into a lower cavity 24a and an upper cavity 24b. The lower cavity 24a is gradually decreased 15 in its diameter toward an upper end thereof and has a truncated cone-shaped contour. The upper cavity 24b is communicated with the lower cavity 24a to continuously extend upward and has a lower end of a diameter greater than the upper end of the lower cavity 24a. Also, the upper cavity 24b is gradually decreased in its 20 diameter toward an upper end thereof and has a truncated cone-shaped contour. The hook engaging portion 25 serving as a shoulder, with which the hook part 35 of the rod 34 is engaged, is formed between the lower and upper cavities 24a and 24b.

The upper cavity 24b may have a circular column-shaped contour and therefore a uniform diameter.

An elongate hole 21c is defined through the upper half of the adapter 21. The elongate hole 21c is communicated with the 5 upper cavity 24b so that injection liquid can be discharged through the upper cavity 24b and the elongate hole 21c.

On the other hand, a radius l_2 of the upper end of the lower cavity 24a is made smaller than the eccentricity l_1 of the rod 34 from the central axis y-y of the cylinder 10. If the plunger 30 10 is pushed into the cylinder 10, the upper end of the rod 34 is bent inward toward the central axis of the adapter 21 while being brought into contact with an inner surface of the adapter 21, defining the lower cavity 24a. The hook engaging portion 25 is formed at a height of h_2 from the lower end of the adapter 21, 15 which is smaller than a height h_1 of the rod 34. Thus, if the plunger 30 is fully pushed into the cylinder 10, the hook part 35 which is formed on the upper end of the rod 34 is positioned above the hook engaging portion 25.

Six grooves 26 are vertically defined on the inner surface 20 of and adjacent to the lower end of the adapter 21. The grooves 26 are defined to have a width t_1 which is larger than a width t_2 of the pair of projections 36 which are formed on the upper end surface of the plunger 30. Due to this fact, if the plunger 30 is

fully pushed into the cylinder 10, the pair of projections 36 are fitted into two of the grooves 26.

Meanwhile, projected wall portions 27, each of which is formed between two adjoining grooves 26, have lower ends which are 5 curved to define a U-shaped outline. Hence, if the plunger 30 is pushed into the cylinder 10 and the projections 36 are bumped against lower ends of the projected wall portions 27, as the projections 36 are slid along the curved surfaces of the projected wall portions 27, the plunger 30 is slightly rotated with respect 10 to the cylinder 10, whereby the projections 36 are smoothly inserted into the grooves 26.

The head part 33 of the plunger 30 is covered by an annular packing member 40.

Hereafter, an assembling procedure and operations of the 15 safety syringe according to the present invention, constructed as mentioned above, will be described. First, the O-ring 50 is fitted around the adapter 21, and the hub 23 to which the injection needle 22 is secured is positioned above the upper end of the neck part 11 of the cylinder 10. Then, by applying force 20 of a predetermined magnitude to and thereby pushing the adapter 11 from the lower end of and through the inside of the cylinder 10 toward the neck part 11, as the adapter 21 is threadedly coupled to the neck part 11, the adapter 21 and the neck part 11 of the

cylinder 10 are firmly coupled with each other in a state wherein the outward flange 21b of the adapter 21 is fitted into the annular seat portion 10d formed on the lower surface of the neck part 11 of the cylinder 10. And, the hub 23 is forcibly press-
5 fitted around the upper half of the adapter 21. Then, the head part 33 of the plunger 30 is covered by the packing member 40. Thereafter, by fitting the plunger 30 into the cylinder 10, the assembling procedure of the safety syringe is completed.

In the case of using the safety syringe, after inserting
10 the injection needle 22 into a container in which injection liquid is received, by pulling the plunger 30 out of the cylinder 10, injection liquid is sucked into and accommodated in the cylinder 10. After pricking the injection needle 22 of the safety syringe at a desired position into the human body, by pushing the plunger
15 30 into the cylinder 10, injection liquid is supplied into the human body through the injection needle 22. As the plunger 30 is pushed into the cylinder 10, if the packing member 40 covering the head part 33 of the plunger 30 is brought into contact with the outward flange 21b of the adapter 21 as shown in FIGs. 7 and 8,
20 injection of liquid medicine is completed.

At this time, the projections 36 formed on the upper end surface of the head part 33 of the plunger 30 are inserted into the grooves 26 of the adapter 21, and the rod 34 is inserted into

the cavity 24. The upper end of the rod 34 is bent inward toward the central axis y-y of the cylinder 10 while being brought into contact with the inner surface of the adapter 21, defining the lower cavity 24a, and then, the hook part 35 formed on the upper 5 end of the rod 34 is positioned above the hook engaging portion 25. Upon completion of injection, the injection needle 22 is removed from the human body. Thereafter, by reversely rotating the polygonal knob portion 35 of the plunger 30, the adapter 21 and the plunger 30 are integrally and reversely rotated with each 10 other. By this, as the adapter 21 is unthreaded from the neck part 11 of the cylinder 10, the adapter 21 is retracted into the cylinder 10.

If the adapter 21 is completely unthreaded from the neck part 11 of the cylinder 10 by the integral rotation of the plunger 15 30 and the adapter 21, by pulling the plunger 30 out of the cylinder 10, as shown in FIG. 9, the hook part 35 of the rod 34 is engaged with the hook engaging portion 25 of the adapter 21, and thereby, the injection needle assembly 20 is also retracted into the cylinder 10. At this time, as the rod 34, which is bent 20 inward toward the central axis of the adapter 21, is unbent to extend in the vertical direction, the rod 34 biases the adapter 21 at the inner surface defining the lower cavity 24a, whereby the adapter 21 is inclined sideways in the cylinder 10. Therefore,

the injection needle 22 is also inclined sideways in the cylinder 10.

Then, by pushing again the plunger 30 into the cylinder 10, as best shown in FIG. 10, the injection needle 22 is collapsed 5 against an inner surface of the cylinder 10.

Industrial Applicability

As apparent from the above descriptions, the safety syringe according to the present invention provides advantages in that, since an adapter having connected thereto an injection needle is 10 threadedly coupled to a neck part of a cylinder, fluctuation of the injection needle is prevented, whereby it is possible to prick the injection needle at a precise position. In the present invention, grooves are vertically defined in the adapter and projections are vertically and projectedly formed on a plunger so 15 that, when the projections are fitted into the grooves, shock is not generated. If the plunger is rotated, the adapter is integrally rotated therewith and unthreaded from the neck part of the cylinder. A rod is vertically and projectedly formed on an upper end surface of the plunger so as to be eccentrically 20 positioned from a central axis of the cylinder, and an upper end of the rod is formed with a hook part. The adapter is defined with a cavity, and the upper end of the rod is inserted into the

cavity while being bent inward toward a central axis of the adapter. A hook engaging portion is formed on an inner surface of the adapter so that the hook part of the rod can be engaged into the hook engaging portion. If the plunger is pulled out of the 5 cylinder, as the injection needle is withdrawn into the cylinder, the injection needle is inclined sideways, whereby it is possible to simply collapse the injection needle by pushing the plunger into the cylinder.

Claims

1. A safety syringe comprising:

a cylinder defining a space for accommodating injection liquid and having a neck part projectedly formed on an upper end

5 thereof;

a plunger movably inserted into the cylinder;

an adapter coupled to the neck part of the cylinder; and

an injection needle connected to the adapter;

wherein a rod vertically projects from an upper end surface

10 of the plunger in such a way as to be eccentrically positioned from a central axis of the cylinder, and an upper end of the rod is formed with a hook part; and

wherein the adapter is defined with a cavity into which the rod can be inserted, an inner surface of the adapter which defines

15 the cavity is formed as an inclined surface so that the upper end of the rod can be brought into contact with the inner surface of the adapter and thereby bent inward when the plunger is pushed into the cylinder, a hook engaging portion is formed on the inner surface of the adapter so that the hook part of the rod can be 20 engaged into the hook engaging portion, the adapter is threadedly coupled to the neck part of the cylinder, and coupling means is arranged to the adapter and the plunger in a manner such that the adapter can be integrally rotated when the plunger is rotated.

2. The safety syringe as claimed in claim 1, wherein the adapter and the neck part of the cylinder are respectively formed with helical threads which are threadedly coupled with each other.

3. The safety syringe as claimed in claim 2, wherein the 5 helical threads are formed to have a slope of 25~50° when measured from a horizontal plane which is orthogonal to the central axis of the cylinder.

4. The safety syringe as claimed in claim 1, wherein the coupling means comprises grooves which are defined adjacent to a 10 lower end of the adapter, and projections which are formed on the upper end surface of the plunger to be inserted into the grooves of the adapter.

5. The safety syringe as claimed in claim 4, wherein the grooves are defined on the inner surface of and adjacent to the 15 lower end of the adapter to extend in a vertical direction, and the projections project from the upper end surface of the plunger in the vertical direction.

6. The safety syringe as claimed in claim 5, wherein a

pair of projections are formed on the upper end surface of and adjacent to an edge of the plunger so that they are oppositely positioned to each other.

7. The safety syringe as claimed in claim 5, wherein
5 projected wall portions each of which is formed between two adjoining grooves have lower ends which are curved to define a U-shaped outline.

8. The safety syringe as claimed in claim 1, wherein the cavity, which is defined in the adapter and into which the rod is
10 inserted, has a central axis which corresponds to the central axis of the cylinder, and is divided into a lower cavity and an upper cavity, the lower cavity being gradually decreased in its diameter toward an upper end thereof and having a truncated cone-shaped contour, the upper cavity being communicated with the lower cavity
15 to continuously extend upward and having a lower end of a diameter greater than the upper end of the lower cavity.

9. The safety syringe as claimed in claim 8, wherein the upper cavity is gradually decreased in its diameter toward an upper end thereof and has a truncated cone-shaped contour.

10. The safety syringe as claimed in claim 8, wherein the upper cavity has a circular column-shaped contour of a uniform diameter.

11. The safety syringe as claimed in claim 8, wherein the 5 hook engaging portion is formed between the lower and upper cavities so that the hook part of the rod can be engaged with the hook engaging portion.

12. The safety syringe as claimed in claim 1, wherein a lower end of the adapter, which is coupled to the neck part of the 10 cylinder, is formed with an outward flange.

13. The safety syringe as claimed in claim 12, wherein an annular seat portion is formed on a lower surface of the neck part of the cylinder, and an O-ring is intervened between the outward flange of the adapter and the seat portion of the neck part.

15 14. The safety syringe as claimed in claim 1, wherein a polygonal knob portion is formed on a lower end of the plunger.

15. The safety syringe as claimed in claim 14, wherein the knob portion is formed to have a contour of a quadrangle with

each side curved inward.

16. The safety syringe as claimed in claim 1, wherein the hook engaging portion is formed as a shoulder on which the inner surface of the adapter, defining the cavity, is flared outward.

FIG. 1

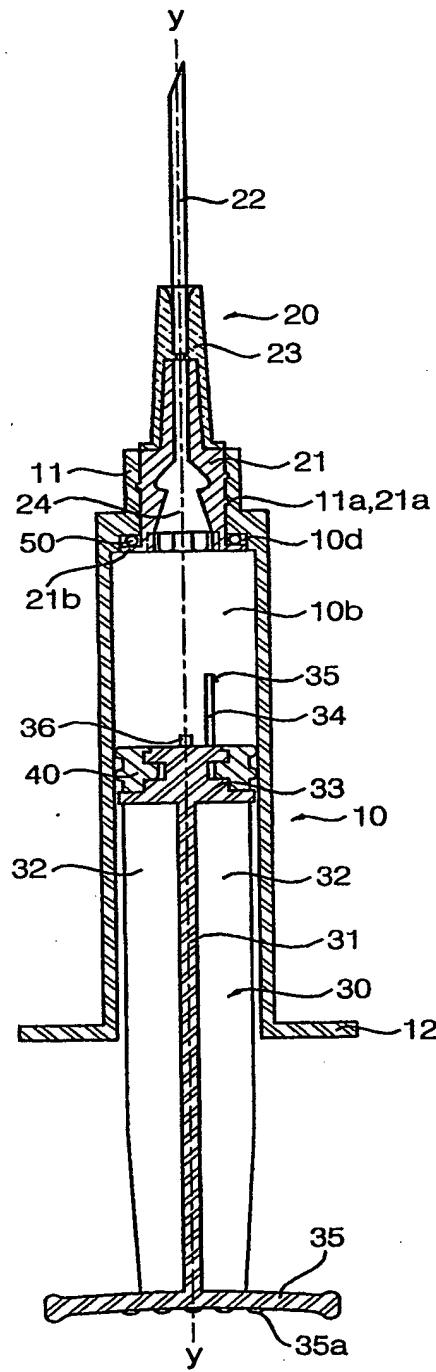


FIG. 2

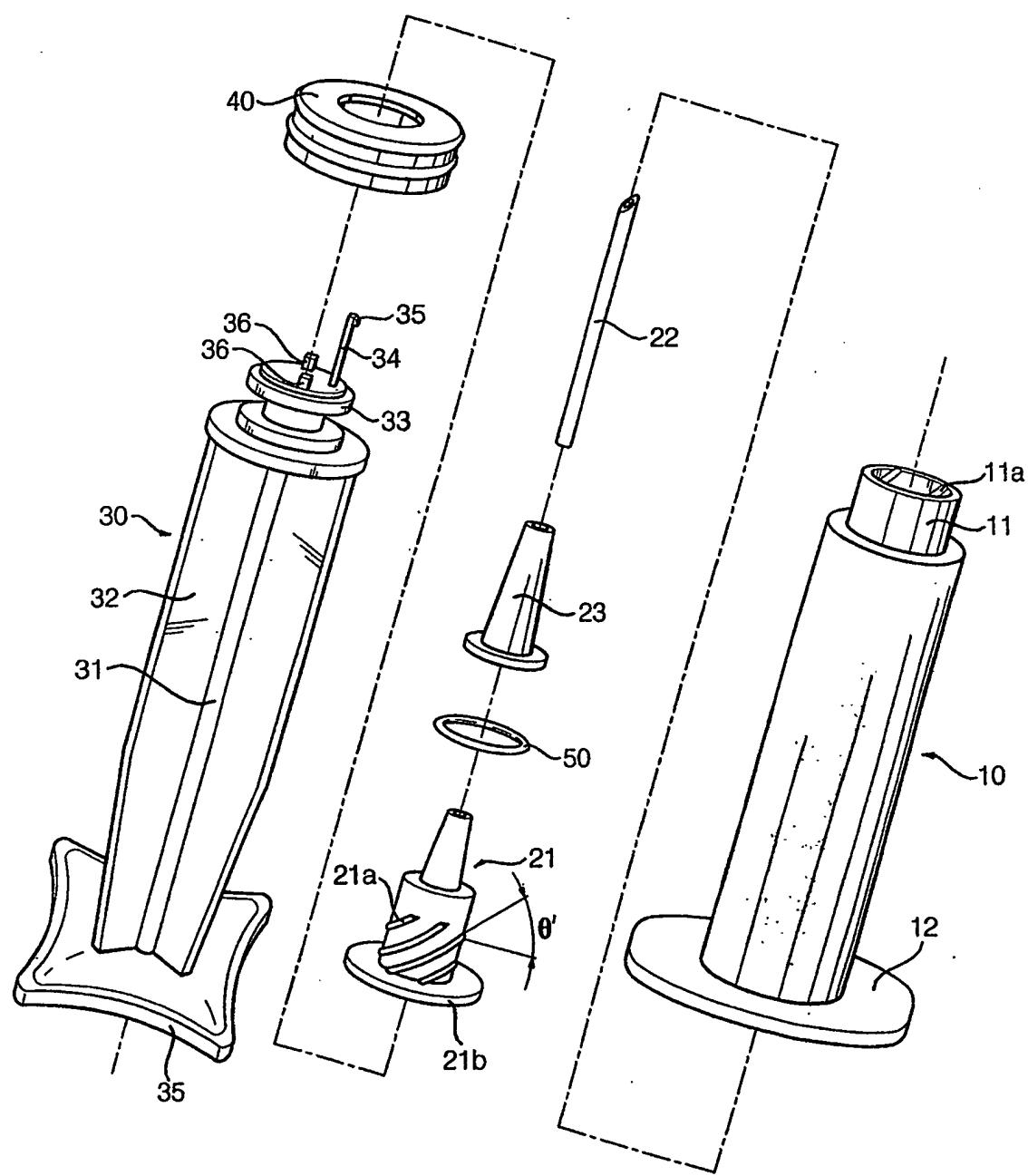


FIG. 3

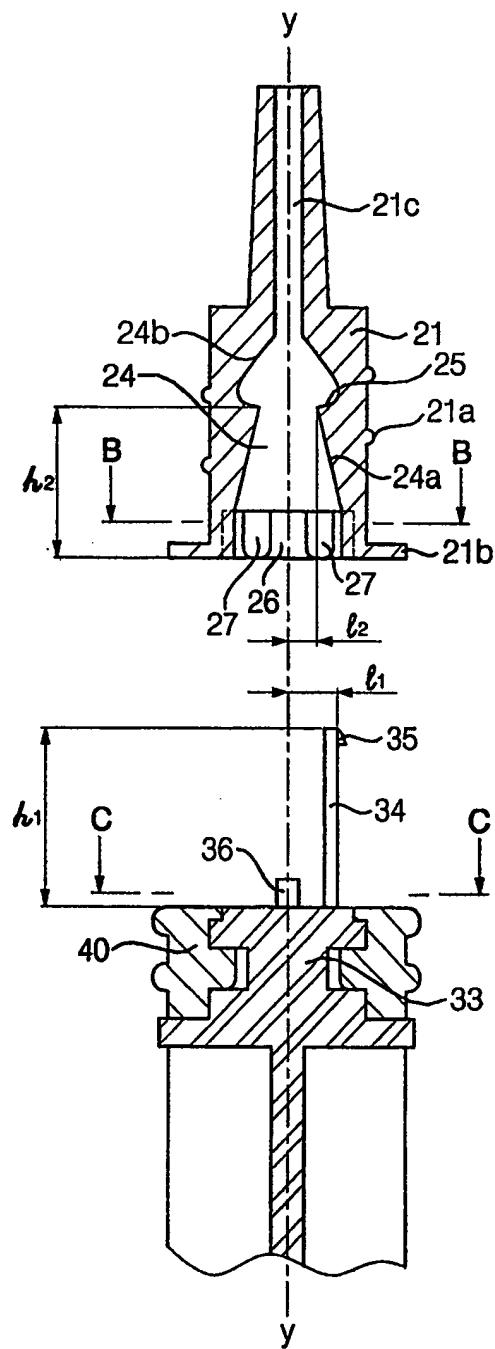


FIG. 4

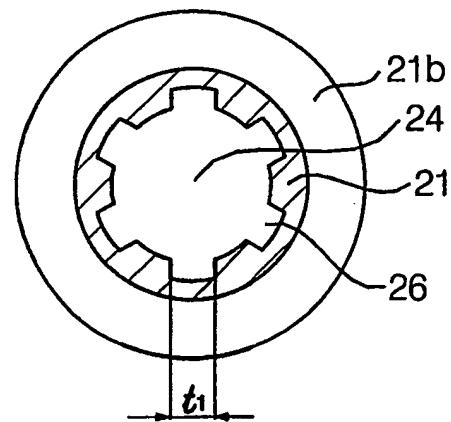


FIG. 5

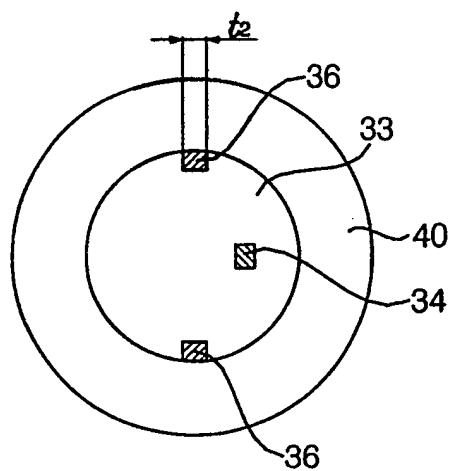


FIG. 6

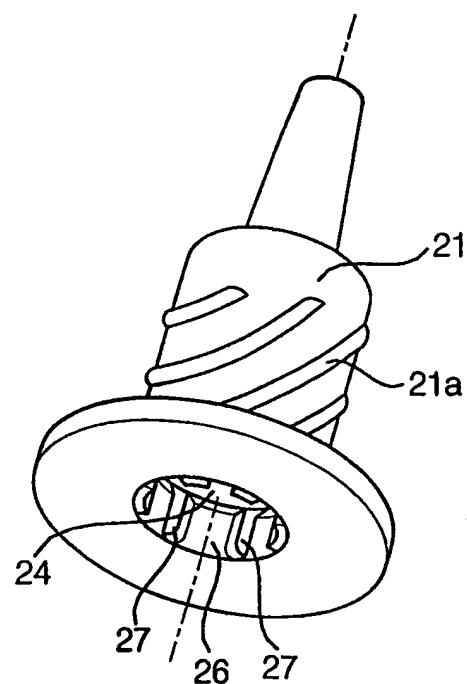


FIG. 7

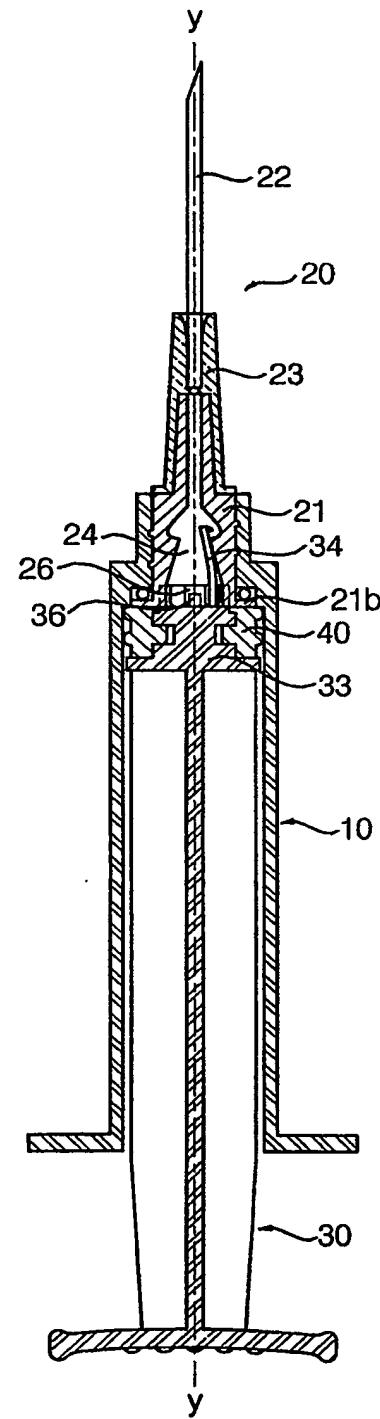


FIG. 8

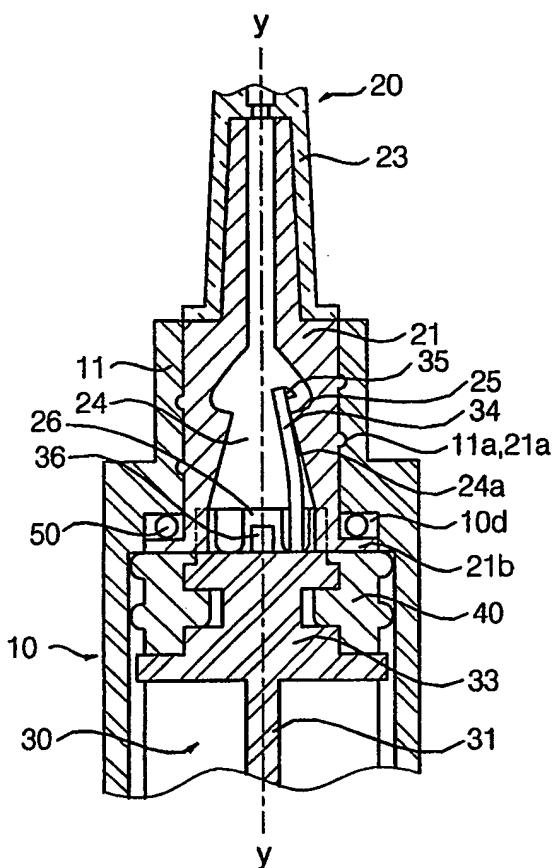


FIG. 9

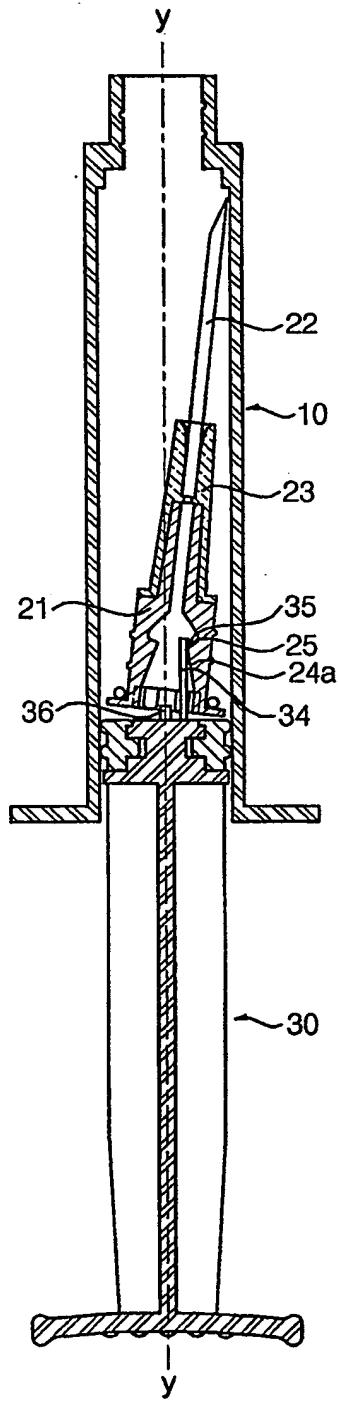
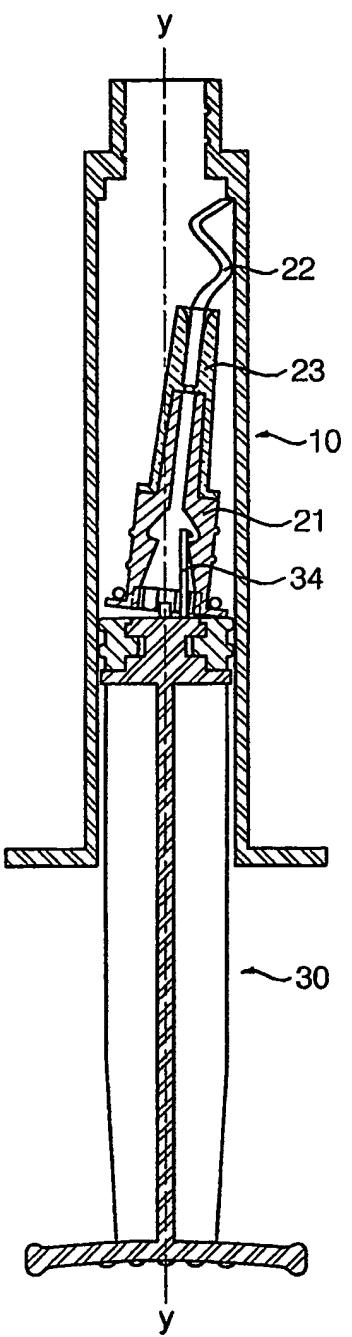


FIG. 10



INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR01/02064

A. CLASSIFICATION OF SUBJECT MATTER

IPC7 A61M 5/178

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7 A61M5

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Patent and applications for inventions since 1975
Utility Models and applications for Utility Models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

KIPASS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 9209320A1 (Nujenko PTY Ltd.) 11 June 1992 see the whole document	1-16
Y	US 5328484A (Brice Somers) 12 July 1994 see the whole document	1-16
A	US 5336198A (Innova Development Corp.) 9 August 1994 see the whole document	1-16
Y	KR 91-4532Y (Bang, Y.C.) 29 June 1991 see the whole document	1-16
Y	KR 01-249104Y (Wang, L.) 21 September 2001 see the whole document	1-16

Further documents are listed in the continuation of Box C.

See patent family annex.

- * Special categories of cited documents:
- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier application or patent but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "&" document member of the same patent family

Date of the actual completion of the international search

26 AUGUST 2002 (26.08.2002)

Date of mailing of the international search report

27 AUGUST 2002 (27.08.2002)

Name and mailing address of the ISA/KR

 Korean Intellectual Property Office
920 Dumsan-dong, Seo-gu, Daejeon 302-701,
Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

KIM, Yong Il

Telephone No. 82-42-481-5589



INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR01/02064

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9209320A1	11 June 1992	US 5531705A JP 6504923T2 EP 559734A1 CA 2099587AA DK 285990A DE 69129752C0 AT 168020E AU 667296B2	2 July 1996 9 June 1994 15 September 1993 31 May 1992 31 May 1992 13 August 1998 15 July 1998 21 March 1996
US 5328484A	12 July 1994	EP 582849A1 DE 9311907U1 JP 6178810A2	16 February 1994 9 December 1993 28 June 1994
US 5336198A	9 August 1994	WO 9417843A1 EP 681487A1 DE 69428981T2 AU 6128894A1 SG 52500A1 ES 2167359T3	18 August 1994 1 February 1994 1 February 1994 29 August 1994 28 September 1998 16 May 2002
KR 91-4532Y	29 June 1991	NONE	
KR 01-249104Y	21 September 2001	NONE	